

# Howard County

M A R Y L A N D

## Alpha Ridge Landfill Gas-to-Energy System Capital Project

In 1999, Howard County voluntarily constructed a landfill gas collection and destruction (flare) system at the Alpha Ridge Landfill in Marriottsville, as part of the capping of an old area of the Landfill. The County has been searching for a beneficial use for the gas resource that the Landfill produces. As a result, a landfill gas-to-energy generating system is currently under design and in the process of obtaining the necessary permits.

The County is purchasing a Jenbacher generator in part because of its controls and lower emissions as compared to similar generators. The generator will convert part of the existing landfill gas flow to energy and will be housed in a special trailer-like container approximately 41' x 11' x 11' in size (about the size of a small tractor trailer container). The generator will be located next to the existing flare on the east side of the landfill. A gas compressor will also be enclosed in a separate, smaller container. The new generator system will be located next to the existing flare system on the east side of the landfill.

The landfill gas-to-energy system will be installed by a contractor and operated by the Howard County technicians and electricians who currently operate the landfill gas collection and flare. The electricity generated will power the gas collection system, the compressor and generator, an electric vehicle charging station and the remainder will be sold. Howard County Government is always looking for new ways to protect the environment, while reducing electricity consumption and offsetting costs.



### **Questions Asked Regarding the Landfill Gas-to-energy Project at the public hearing:**

1. *Will the landfill gas-to-energy system cause negative health impacts?*

Answer: No, emissions from the landfill gas-to-energy system will pose no significant risks to people's health. In fact, burning landfill gas destroys most of the potentially hazardous constituents of the gas. Such combustion does form miniscule quantities of some potentially hazardous chemicals. The U.S. Environmental Protection Agency (EPA)

and other regulatory agencies have evaluated these chemical-emissions and found that the emission-rates are acceptably small and are the same types and amounts of chemicals released when other fuels, such as gasoline or home heating oil, are burned to produce energy.

2. *How would emissions from the proposed generator system differ from emissions from the existing flare?*

Answer: Uncontrolled emissions from the Landfill meet the regulatory requirements established by the EPA. However, the County also installed a landfill gas extraction and destruction system (via gas-flaring) to collect and combust the Landfill gas, thereby further minimizing potentially hazardous emissions. Both the County's existing flare system and the proposed generator system produce similar emissions because they are control measures that destroy some 98% of the gas contaminants that are captured and combusted. Both systems have been evaluated by the EPA and other regulatory agencies, and have been found to pose no significant health risks.

In the Maryland Department of Environment's (MDE) air permit-to-construct tentative determination, MDE assumed both the flare and the generator will operate concurrently at the maximum capacity therefore the quantity of emissions appears to increase significantly from existing conditions. This is double-counting and not possible. Emissions do not significantly increase when the generator is constructed. The emission totals are projected to be well below major source thresholds set by EPA.

3. *What contaminants are in the Landfill gas?*

Answer: The EPA publishes detected concentrations of gas constituents from various landfills in the U.S. in their "AP-42, Compilation of Air Pollutant Emission Factors" publication. The concentrations of the constituents in a recent sample of the Alpha Ridge Landfill gas are in most cases lower than the AP-42 concentrations. As previously mentioned, both the flare and generator systems are control measures that destroy approximately 98% of the constituents found in the Landfill's gas. For a copy of the sample analysis, contact the Bureau of Environmental Services at 410-313-6444.

4. *What emissions testing will be required?*

Answer: The generator system is certified by the manufacturer to meet federal emissions standards. In addition, compliance stack testing of the generator system for nitrogen oxides (NO<sub>x</sub>), carbon monoxide (CO), and volatile organic compounds (VOCs) will be conducted within 180 days of the initial start-up to quantify pollutant emissions and demonstrate compliance with the emission limits specified in the air permit-to-construct. The Title V permit for Alpha Ridge Landfill, which will be modified and reissued after the air permit-to-construct expires, will include requirements for testing, monitoring, recordkeeping, and reporting.

5. *Will the County go above and beyond federal and state requirements?*

Answer: Howard County has already gone above and beyond federal and state requirements by constructing and operating a flare system that captures and destroys the Landfill's gas. Now with the generator system, scientists and engineers at both the federal and state levels have determined that the proposed design is protective of the environment and public health.

6. *What safety measures are and will be in place to prevent an explosion?*

Answer: The County has staff on-call 24 hours a day, 7 days a week to monitor the Landfill's gas system and other environmental systems. The Landfill's gas system which includes the flare and generator has several alarm conditions and automatic system shutoffs that will activate well before any safety issue were to arise. In addition, the proposed generator has internal safety shut-offs in place, including:

- **Knock Sensors** – Each cylinder is equipped with a knock sensor which detects any unusual combustion in the cylinder (knock, misfire, etc.) and recalibrates or shuts down the engine.
- **Flame Arrestor** – The flame arrestor prevents the generator from back firing.
- **Smoke and Gas Detection** – These devices are installed inside the trailer/container to detect gas leaks and fire. If detected, the engine is shut down.
- **Gas train** – The gas train includes safety devices to shut down gas flow when a problem is detected.
- **Safety Shutdowns** – The generator is equipped with many sensors, which monitor all critical operating parameters on the generator; should any of these parameters deviate from specification, the generator will shut down.<sup>1</sup>

7. *Has the sound study looked at low-frequency vibrations from the landfill gas-to-energy equipment?*

Answer: A sound study was conducted by Hessler Associates, Inc. that included background testing on the A-weighted scale, which represents human perception of sound and is the basis of noise regulations. Low frequency (tonal) issues were not detected from the existing landfill gas blower and flare equipment. Hessler also reviewed noise information provided by the manufacturers of the proposed new equipment, and concluded that discrete tones (including low frequency vibrations) are not anticipated. The generator container has been upgraded, a hospital grade silencer has been added and the gas compressor has been containerized proactively to address sound.

8. *Is the County planning on increasing the Landfill's gas production to increase electricity generation through the addition of moisture, intentionally directing compostable material into the Landfill, or by decreasing the vacuum on the wellfield?*

Answer: No, the County is not planning on increasing the Landfill's gas production. In fact, the County is installing a generator that is sized for a gas flow rate that is lower than the existing gas flow rate at the Landfill. Given the generator size, there would be no advantage to increasing the production of the Landfill's gas output.

9. *What is the cost of the project? What is the payback period?*

Answer: The capital cost of the project is \$3,899,623 and the payback period is estimated to be 10 to 15 years depending on the energy market. If you would like to see the pro forma sheet, please contact the Bureau of Environmental Services at 410-313-6444.

10. *Will the County sell the Renewable Energy Credits associated with the electricity generated?*

Answer: The County may enter into an agreement with the Northeast Maryland Waste Disposal Authority to sell both the electricity and the renewable energy credits from the project. The Authority is a quasi-state agency and Howard County is a member. The Authority also is a member of PJM Interconnection (a regional energy transmission organization) and has considerable experience with the marketing and sale of electricity and renewable energy credits. The sale of these credits will help reimburse the County for the project construction.

11. *Why are you comparing the offset from the landfill gas-to-energy system to emissions from coal powered electricity generation plants?*

Answer: In Maryland, nearly 60% of our electricity generated comes from coal and another 30% comes from nuclear powered plants;<sup>2</sup> therefore, the majority of our electricity in Maryland is generated from non-renewable resources. The generation of electricity from landfill gas will offset our usage of non-renewable energy resources.

---

<sup>1</sup> Nixon Power Services Company

12. *Does the County plan to install a natural gas pipeline to supplement the landfill gas?*

Answer: No, the County does not plan to install a natural gas pipeline and will not be purchasing natural gas to produce electricity. The County has sized the generator system such that it requires less than the Landfill's current gas flow to operate at full load; however, excess gas will continue to flow to the flare.

13. *Did the County look at the options of installing a turbine?*

Answer: Yes, the County evaluated the option of installing micro-turbines, and found that such an option would not be cost effective. To provide the same production as the generator system, approximately seventeen 60 kW micro-turbines would have been needed.

14. *Can a filter be installed on the generator system?*

Answer: The gas does not need to be pre-treated with a filter before it is combusted in the generator. After combustion, the emissions only contain small quantities of particles and other materials, such that no filter is needed or appropriate. Facilities that emit large quantities of exhaust gases, such as foundries, waste-to-energy plants, and various chemical manufacturing plants, are often equipped with a series of filters termed "baghouses," but such equipment is not designed for small generator systems such as the one proposed at the landfill.

15. *Can a Continuous Emissions Monitoring System be installed?*

Answer: Continuous Emissions Monitoring Systems (CEMS) are usually appropriate for large waste-to-energy systems, but not for a small, gas-fired project like the kind being considered by Howard County. Generator systems, like that Howard County plans to utilize, have very predictable emissions profiles and to the County's knowledge, are not equipped with CEMS.

16. *Are dioxins and furans released during the combustion of landfill gas?*

Answer: Yes, according to U.S. EPA.<sup>3</sup>

"EPA's review of the available data indicates that dioxins/furans can be released in small amounts when landfill gas is combusted by flare or for recovering energy. Based on national and international source tests, the concentration of dioxins from landfill gas combustion ranges from non-detectable to 0.1 nanograms ( $10^{-9}$  grams) of toxic equivalents (TEQ) per dry standard cubic meter of exhaust, at 7 percent oxygen. Because of the health threat from uncontrolled emissions of other organic compounds in landfill gas, EPA found, in developing emissions standards, that landfill gas destruction in a proper control device (e.g., flare or energy recovery unit) with minimal by-product generation of dioxins/furans is preferable to the release of uncontrolled landfill gas. In summary, EPA believes that the potential for dioxin emissions from the combustion of landfill gas is small."

17. *How does landfill gas combustion affect mercury emissions?*

Answer: According to U.S. EPA.<sup>4</sup>

---

<sup>2</sup> Source: *Maryland Power Plants and the Environment: A review of the impacts of power plants and transmission lines on Maryland's natural resources (CEIR-15)* (as cited on Maryland Energy Administration's website, Energy 101, Energy Basics <http://energy.maryland.gov/energy101/>)

<sup>3</sup> Source: *Frequently Asked Questions About Landfill Gas and How It Affects Public Health, Safety, and the Environment*, EPA Office of Air and Radiation, June 2008. [http://www.midland-mi.org/government/departments/utilities/faqs\\_about\\_LFG.pdf](http://www.midland-mi.org/government/departments/utilities/faqs_about_LFG.pdf)

<sup>4</sup> Source: *Frequently Asked Questions About Landfill Gas and How It Affects Public Health, Safety, and the Environment*, EPA Office of Air and Radiation, June 2008. [http://www.midland-mi.org/government/departments/utilities/faqs\\_about\\_LFG.pdf](http://www.midland-mi.org/government/departments/utilities/faqs_about_LFG.pdf)

“Although it is present throughout the environment, mercury is a health concern because it can bioaccumulate through the food chain as methylated mercury, an organic, more toxic form of mercury. Sources of mercury in Municipal Solid Waste (MSW) landfills can include batteries, fluorescent light bulbs, electrical switches, thermometers, and paints. Once mercury enters the waste stream, it will ultimately be released from the landfill and is contained in uncontrolled landfill gas (LFG). However, combustion of LFG reduces the toxicity of LFG emissions by converting the organic mercury compounds, including methylated mercury, to less toxic, less hazardous, inorganic mercury compounds. According to EPA's 1997 Mercury Study Report to Congress, MSW landfills contributed less than 0.1 percent of the total mercury released from all artificial sources in the United States in 1994. When compared on an annual basis, mercury emissions from LFG are significantly less than mercury emissions generated by small, oil-fired boilers used in homes and apartments.”

*18. Does the electrical distribution system need to be upgraded as a result of the landfill gas-to-energy project?*

Answer: No. Studies performed by PJM, and Baltimore Gas and Electric (BGE) indicated that the electrical load generated by the gas-to-energy project will not adversely affect the PJM network, and that this load can be connected to BGE's local distribution system.

Additional Resources:

- <http://www.atsdr.cdc.gov/HAC/landfill/html/ch5.html>
- [http://www.midland-mi.org/government/departments/utilities/faqs\\_about\\_LFG.pdf](http://www.midland-mi.org/government/departments/utilities/faqs_about_LFG.pdf)
- [http://www.seas.columbia.edu/earth/wtert/sofos/Importance\\_of\\_LFG\\_Capture\\_and\\_Utilization\\_in\\_the\\_US.pdf](http://www.seas.columbia.edu/earth/wtert/sofos/Importance_of_LFG_Capture_and_Utilization_in_the_US.pdf)
- <http://www.nrdc.org/air/energy/lfg/lfg.pdf>